Volunteer Lake Assessment Program Individual Lake Reports

FOREST LAKE, WINCHESTER, NH

MORPHOMETRIC DATA

Watershed Area (Ac.):	4,480	**Max. Depth (m):**	9.8	**Flushing Rate (yr^{-1}):**	5
Surface Area (Ac.):	87	**Mean Depth (m):**	4.8	**P Retention Coef:**	0.46
Shore Length (m):	3,500	**Volume (m^3):**	1,645,000	**Elevation (ft):**	443

TROPHIC CLASSIFICATION

Year	Trophic class
2005	EUTROPHIC
2009	MESOTROPHIC

KNOWN EXOTIC SPECIES

Variable Milfoil

The Waterbody Report Card tables are generated from the DRAFT 2014 305(b) report on the status of N.H. waters, and are based on data collected from 2004-2013. Detailed waterbody assessment and report card information can be found at www.des.nh.gov/organizations/divisions/water/wmb/swqa/index.htm

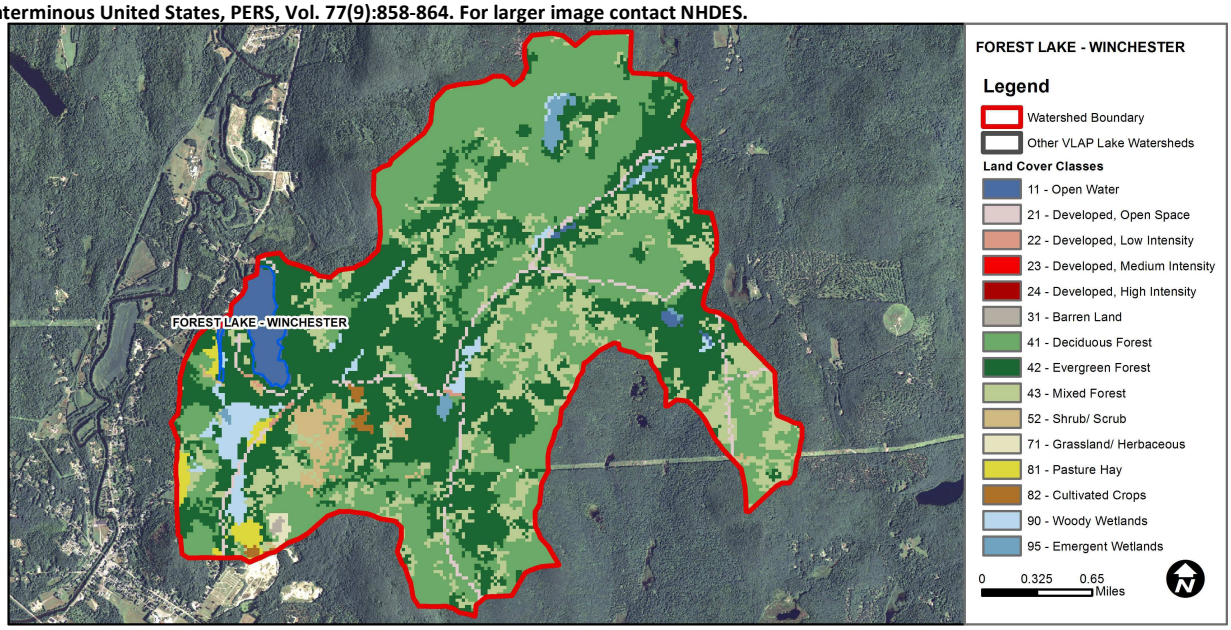
Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Slightly Bad	The calculated median is from 5 or more samples and is > indicator and the chlorophyll a indicator is exceeded.
	pH	Slightly Bad	>10% of samples exceed criteria by a small margin (minimum of 2 exceedances).
	Oxygen, Dissolved	Encouraging	There are < 10 samples with 0 exceedances of criteria. More data needed.
	Dissolved oxygen satura	Encouraging	There are < 10 samples with 0 exceedances of criteria. More data needed.
	Chlorophyll-a	Slightly Bad	The calculated median is from 5 or more samples and is > indicator.
Primary Contact Recreation	Escherichia coli	Very Good	Where there are no geometric means, all bacteria samples are < 75% of the geometric mean. Where there are geometric means all single bacteria samples are < the SSMC and all geometric means are < geometric mean criteria.
	Cyanobacteria hepatoto	Slightly Bad	Cyanobacteria bloom(s).
	Chlorophyll-a	Slightly Bad	There are >10% of samples (minimum of 2), exceeding indicator.

BEACH PRIMARY CONTACT ASSESSMENT STATUS

FOREST LAKE - TOWN BEACH	Escherichia coli	Very Good	Where there are no geometric means, all bacteria samples are < 75% of the geometric mean. Where there are geometric means all single bacteria samples are < the SSMC and all geometric means are < geometric mean criteria.
FOREST LAKE - TOWN BEACH	Cyanobacteria	Slightly Bad	Cyanobacteria bloom(s).

WATERSHED LAND USE SUMMARY

Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J., 2011. Completion of the 2006 National Land Cover Database for the Conterminous United States, PERS, Vol. 77(9):858-864. For larger image contact NHDES.



Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
Open Water	2.22	Barren Land	0.08	Grassland/Herbaceous	0.23
Developed-Open Space	2.21	Deciduous Forest	37.28	Pasture Hay	1
Developed-Low Intensity	0.14	Evergreen Forest	35.08	Cultivated Crops	0.34
Developed-Medium Intensity	0	Mixed Forest	16.47	Woody Wetlands	2.28
Developed-High Intensity	0	Shrub-Scrub	1.74	Emergent Wetlands	0.76

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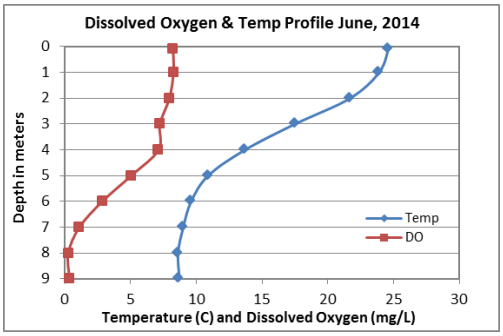
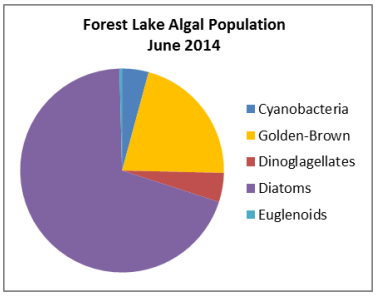
2014 Data Summary

Observations and Recommendations (*Refer to Table 1 and Historical Deep Spot Data Graphics)*

- **Chlorophyll-a:** Chlorophyll levels were average in June and then increased to elevated levels in August. The 2014 average chlorophyll level remained stable from 2013 and was greater than the state median. Historical trend analysis indicates relatively stable chlorophyll levels with moderate variability. Chlorophyll levels have become more stable since 2008.
- **Conductivity/Chloride:** Epilimnetic (upper water layer) conductivity and chloride levels were approximately equal to the state medians. Historical trend analysis indicates significantly decreasing (improving) epilimnetic conductivity since monitoring began. We hope to see this continue! Campground Inlet, NE Branch, Outlet, and Sandy Point Inlet conductivity levels were within a low to average range. Dump Branch conductivity and chloride levels remain greater than the state median. However conductivity levels have significantly decreased in Dump Branch and Campground Inlet since monitoring began. We hope to see this continue!
- **E. coli:** Campground Inlet A E. coli levels were elevated in August following a significant storm event. This indicates that stormwater runoff is likely transporting localized sources of E.coli to the Inlet. Campground Inlet B and 5 Forest Ave. E. coli levels were low and much less than the state standard of 406 cts/100 mL for surface waters.
- **Total Phosphorus:** Epilimnetic and Metalimnetic phosphorus levels were low in June and then increased to elevated levels in August. Historical trend analysis indicates highly variable epilimnetic phosphorus levels since monitoring began. Hypolimnetic phosphorus levels were slightly elevated but were the lowest measured since 2003. Campground Inlet, Dump Branch and NE Branch phosphorus levels remained relatively stable from June to August but were in an elevated range. Campground Inlet and Dump Branch phosphorus levels have significantly increased (worsened) since monitoring began. Sandy Point Inlet and Outlet phosphorus levels were low and Sandy Point phosphorus levels have significantly decreased (improved) since monitoring began.
- **Transparency:** Transparency was below average (worse) in 2014 and was the lowest transparency measured since monitoring began. The lower transparency was not necessarily due to algal growth. A significant storm event in August occurred prior to sampling and stormwater runoff may have contributed both sediments and flushed waters rich in tannins and thus highly colored which could have contributed to the lower transparency. Historical trend analysis indicates highly variable transparency since monitoring began.
- **Turbidity:** Epilimnetic turbidity was average, Metalimnetic turbidity was elevated in August likely due to algae, and Hypolimnetic turbidity was elevated due to the formation and accumulation of organic compounds as the summer progressed and dissolved oxygen levels were depleted. Campground Inlet and Dump Branch turbidities were elevated but within average ranges for those stations. NE Branch turbidity was elevated in August following a storm event.
- **pH:** Deep spot, Campground Inlet and Dump Branch pH levels were less than the desirable range 6.5-8.0 units. Historical trend analysis indicates significantly decreasing (worsening) epilimnetic pH since monitoring began.
- **Recommended Actions:** The improving lake and conductivity trends are encouraging, however phosphorus levels in Campground Inlet and Dump Branch have significantly increased and epilimnetic pH has significantly decreased. The increased frequency and intensity of storm events may be flushing wetlands contributing to increased phosphorus and acidity of the water. This highlights the importance of reducing stormwater runoff from lake and watershed properties. There are many references and programs available to assist with those efforts. Contact the VLAP Coordinator for more information. Keep up the great work!





NH Water Quality Standards: Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.
Chloride: > 230 mg/L (chronic)
E. coli: > 88 cts/100 mL – public beach
E. coli: > 406 cts/100 mL – surface waters
Turbidity: > 10 NTU above natural level
pH: between 6.5-8.0 (unless naturally occurring)

NH Median Values: Median values for specific parameters generated from historic lake monitoring data.
Alkalinity: 4.9 mg/L
Chlorophyll-a: 4.58 mg/m^3
Conductivity: 40.0 uS/cm
Chloride: 4 mg/L
Total Phosphorus: 12 ug/L
Transparency: 3.2 m
pH: 6.6

Table 1. 2014 Average Water Quality Data for FOREST LAKE

Station Name	Alk. mg/l	Chlor-a ug/l	Chloride mg/l	Cond. uS/cm	E. Coli #/100ml	Total P ug/l	Trans. m		Turb. ntu	pH
							NVS	VS		
Epilimnion	7.3	6.81	5	44.2		12	2.12	2.55	1.47	6.37
Metalimnion				53.3		14			3.82	6.28
Hypolimnion				64.5		18			12.41	6.35
5 Forest Ave.					10					
Campground Inlet			7	62.4		33			3.41	6.32
Campground Inlet A					335					
Campground Inlet B					10					
Dump Branch			13	105.6		21			8.72	6.33
NE Branch			5	44.8		26			3.09	6.77
Outlet			5	44.8		10			0.95	6.73
Sandy Point Inlet			3	21.3		10			0.84	6.55

Historical Water Quality Trend Analysis

Parameter	Trend	Explanation	Parameter	Trend	Explanation
Conductivity	Improving	Data significantly decreasing.	Chlorophyll-a	Stable	Trend not significant; data moderately variable.
pH (epilimnion)	Worsening	Data significantly decreasing.	Transparency	Stable	Trend not significant; data highly variable.
			Phosphorus (epilimnion)	Stable	Trend not significant; data highly variable.